

**BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN 

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Course Code 

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Fifth Semester B.E. Degree Examinations, September/October 2024

**SYSTEM SOFTWARE AND OPERATING SYSTEM**

Duration: 3 hrs

Max. Marks: 100

*Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.**2. Missing data, if any, may be suitably assumed*

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<b><u>Module-1</u></b>			
1.	a. Define operating system? Explain the dual mode operation of an operating system.	06	(1 : 1 : 1.2.1)
	b. What are the key differences between a multiprocessor system and a single-processor system in terms of architecture, performance, and scalability?	06	(1 : 1 : 1.2.1)
	c. Explain multiprogramming and multitasking systems.	08	(1 : 1 : 1.2.1)
<b>(OR)</b>			
2.	a. List and explain the services provided by OS for the user and efficient operation of system.	06	(1 : 1 : 1.2.1)
	b. What are system calls, and how are they classified? Explain any two classifications of system calls in detail?	06	(1 : 1 : 1.2.1)
	c. What are virtual machines? Explain VM-WARE architecture with a neat diagram.	08	(1 : 1 : 1.2.1)
<b><u>Module-2</u></b>			
3.	a. What is a process? Illustrate with a neat sketch, the states of a process.	06	(1 : 1 : 1.2.1)
	b. Discuss various criteria for CPU scheduling algorithms.	06	(2 : 1 : 1.2.1)
	c. Discuss the Shortest Job First and SRTF scheduling algorithm with suitable example.	08	(2 : 1 : 1.2.1)
<b>(OR)</b>			
4.	a. Compare and contrast the multilevel queue scheduling and multilevel feedback queue scheduling.	06	(2 : 1 : 1.2.1)
	b. List and explain the necessary conditions for deadlock with the help of a resource allocation graph.	06	(2 : 1 : 1.2.1)
	c. Consider the snapshot of a system shown below. Answer the following questions using Banker's algorithm: (i) What is the content of 'need' matrix? (ii) Is the system in a safe state? Justify (iii) If a request from P2 arrives for (0, 4, 2, 0), can request be granted immediately?	08	(3 : 1 : 1.2.1)

Process	Allocation				Request				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	1	2	1	5	2	0
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6				
P4	0	6	3	2	0	6	5	2				
P5	0	0	1	4	0	6	5	6				

**Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)**

### **Module-3**

5. a. Discuss the concept of logical and physical address space. 06 (1 :1 : 1.2.1)  
b. What is fragmentation? Briefly explain the types of fragmentation with suitable examples. 06 (1 :1 : 1.2.1)  
c. Illustrate the concept of swapping with a neat diagram and give an example for total time being taken for swapping. 08 (2 :1 : 1.2.1)

(OR)

6. a. Explain the concept of paging with a neat diagram for paging hardware. 06 (2 :1 : 1.2.1)  
b. Compare and contrast the difference between LRU, FIFO and Optimal. 06 (1 :1 : 1.2.1)  
c. Explain with a neat diagram how to handle a page fault. 08 (2 :1 : 1.2.1)

### **Module-4**

7. a. What is system software? List out the difference between system software and application software. 06 (1 :4 : 1.2.1)  
b. Write a sequence of instructions for SIC to clear a 20-byte string to all blanks. 06 (3 :4 : 1.2.1)  
c. Explain different instruction formats used in SIC/XE machine architecture. 08 (2 :4 : 1.2.1)

(OR)

8. a. Write and explain the algorithm of PASS – 1 of two pass assembler. 06 (2 :4 : 1.2.1)  
b. What is a program block? How multiple program blocks are handled by assemblers? 06 (2 :4 : 1.2.1)  
c. Give the format of the following record necessary to obtain object code. 08 (2 :4 : 1.2.1)  
(i) Header record (ii) Text record (iii) Refer record (iv) Define record  
(v) Modification record

### **Module-5**

9. a. What are the basic functions of a loader? Develop an algorithm for a bootstrap loader. 06 (1 :5 : 1.2.1)  
b. Write an algorithm for pass 2 of a linking loader. 06 (1 :5 : 1.2.1)  
c. What is relocating loader? Explain with example two methods of relocating loader. 08 (1 :5 : 1.2.1)

(OR)

- 10 a. What is an absolute loader? Write an algorithm for absolute loader. 06 (1 :5 : 1.2.1)  
b. Explain the procedure of program linking when the subprograms use external references. 06 (2 :1 : 1.2.1)  
c. With figure explain how loading & calling of a subroutine can be done using dynamic linking. 08 (2 :5 : 1.2.1)

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